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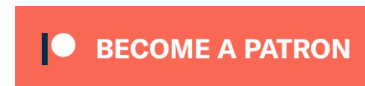
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CAMOUFLAGE

MILITARY TRAINING PAMPHLET

No. 46

Part 2: Field Defences

1941

*Prepared under the direction of
The Chief of the Imperial General Staff.*

THE WAR OFFICE,
20th June, 1941.

PREFATORY NOTE

Military Training Pamphlet No. 46—Camouflage—is the main title of a series which will consist of the following parts:—

- Part 1. General principles, equipment and materials.
- Part 2. Field Defences (all arms).
 - Huts, camps and installations.
 - Vehicles, wheeled and tracked.
 - Artillery, other than anti-aircraft.
 - Anti-aircraft defence.
 - Concealment in the face of the enemy. False work and deceit in the field.

NOTE.—The serial number indicates publication: remainder in preparation.

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MILITARY TRAINING PAMPHLET

No. 46

Part 2: Field Defences 1941

CHAPTER I.—FIELD WORKS

1. Tracks

1. It is chiefly by means of tracks that each type of military activity leaves its signature on the ground to be read by the interpreter of air photographs. A track which is clearly visible from the air and extremely conspicuous on an air photograph may be scarcely discernible to the man on the ground.

There is no way of preventing the existence of tracks and no easy way of rubbing out a track once made. Men must go from where they sleep to where they eat, and from there to where they work, and it depends upon the relative positions of these places whether the story of their daily life will be easy or hard to read from the air.

To say that tracks must be planned ahead is not enough. It is the position of the places to which the tracks lead, the living, eating and working places, that must be planned ahead with such an understanding of the pattern of the background that the essential tracks will fit into it and so escape detection.

Naturally, in all but the most ideal sites the track which is the best hidden is not always the shortest way from point to point, and so track discipline must be established. The tendency to take the short cut must be met by the presence of wire at the points at which this temptation presents itself.

2. Tracks must not only be in the right place, but must be capable of carrying their quota of traffic for as long as they may be in use. Their surfaces must therefore be made so durable that in bad weather traffic is not forced off the established track at impassable points. This work must be finished in good time, or alternate tracks will appear, made by troops who cannot use the planned tracks, while the work of repair is in progress. An additional danger is a track that is not only visible but which also gives away the average volume of traffic using it.

This it will do if allowed to develop bulges followed by waists wherever it passes through a gap or over a bridge. Therefore, unless the degree of troop concentration is to become known to the enemy, all roads and lanes carrying transport must be made firm and weather resisting, while cinders or trenchboards, covered if possible by X.P.M. must be laid on footpaths.

3. It is very important that road building parties cover all spoil and new materials with painted hessian sheets, nets or brushwood, and only leave uncovered the point at which work is proceeding.

It should be possible to keep to the pattern of the landscape by following the north side of hedges or woods, or following the lines of agricultural divisions. But if this cannot be done, and where open country must be crossed, the track must be given a logical and non-military existence and extended beyond its objective to link up with another road or group of buildings, care being taken to study and copy the typical road pattern of the neighbourhood.

Where the ground of a position is already badly marked, the only remedy is to plough or harrow up the bad patches, taking care to extend this treatment over an area of a size and shape that will fit into the general field pattern. Where signs of plough and harrow already exist, the new treatment must follow the surface pattern already established. Tracks left on fallow or grazing land can often be largely eliminated if sheep or cattle are brought in.

2. Daily life

Signs of everyday life are inclined to multiply and need constant watching. Thoughtlessly sited latrines, incinerators and drainage trenches are a real danger. The activities of the cook are rarely confined to cover afforded by the cookhouse, and tend to extend daily, particularly in the form of the irresponsible digging of sumps. If necessary, more accommodation should be provided to contain these activities, while the need for unremitting control should be clearly understood by all.

3. Concealment of works in progress

1. Some works must be concealed because they are connected with objects which, if located, will ultimately be attacked—such as batteries of heavy guns—and others simply because they offer evidence of the presence of troops.

It is not enough to conceal a slit trench after it is dug, a pillbox after construction, or the presence of an underground H.Q. after excavation. Once signs of activity are observed by the enemy, subsequent efforts at concealment will merely be evidence of the existence of something worth concealing.

The digging of the slit trench, the construction of the defence post, the erection of the hut and the building of the pillbox must not be observed if the fact of the existence of the trench, the defence post, the hut or the pillbox is to be concealed.

Successful concealment depends upon successful siting. The difficulty of concealment is in relation to the site. Objects unfavourably sited for concealment may not survive long enough to benefit from their apparent tactical advantage.

Concealment may be either by :

- (1) Temporary overhead covers
- (2) Ground covering.

2. Temporary overhead cover.

Temporary overhead cover may consist of artificial or sometimes of natural material attached to nets or galvanized wire netting, supported on uprights. They may be semi-transparent or opaque. They may be garnished with any suitable material such as hessian strips, steel wool, or painted hessian cut in patches, etc. Natural material such as green brushwood, foliage or grass should be used, if at all, with great discretion. It must either be continually renewed on fading, or sprayed with a weak solution of green paint. It must not be cut in such quantities as to reduce the natural cover where this may be needed or where the fact of its removal will attract the attention of the enemy. It must not be used unnaturally—i.e. many leaves are much lighter underneath than on top. If it is found that they turn over when cut or if they are fixed in an inverted position, the desired result will not be achieved.

An overhead cover is clearly unserviceable if exposed to ground level observation except on the rare occasions when background and contour happen to favour the addition of a system of vertical screens (Part 7, also M.T. Pamphlet No. 30, Part II).

Against low-flying observation, the disadvantage of being unable to secure entirely successful concealment from the oblique view is to some extent offset by the advantage of the fact that the majority of the working party itself will be under cover.

When considering the possibility of low-flying observation, special attention should be paid to the danger of incongruous colour or tone catching the observer's eye. If tarpaulins are used to cover spoil and are not of a colour to match the yellow-green of living vegetation, they are more of a danger than a protection.

If an overhead cover is to be used, it must fulfil the following conditions :—

- i. It must be large enough to cover not only the work itself but any accumulation of materials or plant, and extend in all directions beyond the objects to be concealed to a distance at least equal to $1\frac{1}{2}$ times its height from the ground.
- ii. Its shape must be planned solely in relation to the ground pattern so that if it appears darker or lighter than its surroundings its shape will suggest a small feature in keeping with the general pattern of the landscape.
- iii. It should match the background as nearly as possible both in texture and colour.
- iv. It must be kept as low as possible.
- v. All heaps of light-coloured spoil or materials under the net must be covered.
- vi. It must be firmly erected.

3. Ground covering

Ground covering should be of suitable materials, painted hessian or coir, very heavily garnished nets or galvanized wire netting, steel wool, feathered wire-netting, brushwood, etc.

Tracks must be planned for all working parties and discipline strictly enforced.

4. Choice of method

The choice of the method to be adopted depends on :—

- i. *Type of observation and attack against which concealment is directed*
 - (a) from the air, direct or photographic ;
 - (b) from the ground—by direct observation ;
- ii. *Type of background*
 - (a) as seen from the air ;
 - (b) as seen from ground level.

Against high air observation, the choice of treatment must depend on background. Admittedly, for a flat and featureless background, a large flat overhead cover of the right shape is the only possible solution, but a favourable background which already shows a disorderly pattern may readily absorb the picture of the working party and its activities, particularly if patches of exposed sand or chalk are present in the vicinity. Against this background, suitable ground coverings for areas not immediately being worked on may be enough to prevent detection by the high-flying observer.

Even against a good background, overhead cover is desirable for important works where activity will continue over a long

period and where the quantity of spoil produced is excessive, such as entrances to mines, tunnels or large underground quarters. (See Plate I.)

4. Concealment of work done

1. Up to the moment when track discipline and out-of-bounds areas are established, the process of self-revelation by soil disturbance may be said to be inevitable, continuous, and natural to every kind of activity. Not only do the tracks and other traces left by the party building a pillbox need laborious elimination, but should a second party arrive to conceal the pillbox by disguise, a new set of equally dangerous tracks will be made and the work of elimination have to be repeated.

Usually it will be found that just as slackness of concealment discipline is likely to develop among troops living under the cover of thick woods, so the overhead cover for working parties is likely to breed an excessive amount of unnecessary mess. To make the task of repairing the ground easier, it is most important to limit all heaps of sand, gravel, etc., to the smallest area. If these heaps can be confined to wooden platforms slightly raised above the ground, the danger to grass will be greatly decreased. Excessive spoil produced by large excavations must, if surplus, be removed and dumped out of sight as produced. Duckboards should be placed under planks used to carry the traffic of barrows.

The turf which has been cut should be carefully stacked and kept damp with the cut side of the sods together. It will become useless if allowed to die. When the original excavation is made, the top soil should be set aside and stored in sandbags. This topsoil is not only valuable because of its darker and less conspicuous colour, but because it is only on topsoil that a new crop of grass can be persuaded to grow. It will probably be necessary to cut fresh sods to supplement those set aside for re-turfing. Special care must be taken over the siting of borrow pits so created. Sods must be cut where traces will escape detection. It is sometimes possible to cut re-turfing sods so as to mislead the enemy by creating an illusion of additional trench systems, buried cables, etc. (See Part 7.)

2. Order of work

Having arranged during the progress of the work to restore the original picture, the procedure once work is finished should be as follows :—

- i. Restoration should be planned in its proper sequence, tracks established and discipline enforced.

- ii. The overhead cover should remain in position until the last moment.
- iii. All surplus building and other material must be removed together with all vehicles and mobile plant connected with the work now completed.
- iv. Ground must be cleared of all traces of sand and gravel heaps.
- v. Surplus tracks and flat areas seriously damaged must be ploughed or harrowed, in such a way as to harmonize with the background.
- vi. Areas needing re-turfing (mounds and filled-in excavations) must be treated with topsoil, returfed and isolated.
- vii. Sowing, if successful (*See Part 1, Chapter II*), is the ideal treatment, but because of the delay involved this should only be done when the ground sown can be effectively covered until the grass has grown. Green steel wool of the appropriate texture is excellent for this purpose. It should be pegged down flat over sown areas, care being taken that hard edges are thinned out so that the cover merges into the ground around it. Seed sown under steel wool or any other cover such as coir, which may be used with equal success, will grow more quickly than under normal conditions. The ground cover will fairly soon become unnecessary and the steel wool or coir will then be available for use elsewhere.
- viii. Coal slag clinker and paint provide a crude but effective method of darkening areas of light spoil. This method is perfectly successful against distant observation and air photography, though its appropriateness will vary with the neighbourhood. If coke breeze or ashes are used, they should be sprayed with tar or paint as a binder and darkener. These materials may all be used for artificial ground patterning, which may be an important part of the work of restoring the original picture.
- ix. The use of summer brushwood, etc., must always be considered as a temporary expedient owing to the great loss of covering power when dead, and unless dipped or sprayed with paint, when beginning to fade, its use is inclined to create a dangerous sense of false security. It may, however, be used effectively when bald patches are first sown. Brushwood should be securely pegged down upon the ground thus masking the worn patches and also protecting the seed from

harm. Bushes, trees and tree tops, which may also be treated with paint spray, may be employed very effectively. Their usefulness is, however, not only qualified by their tendency to die but also by the fact that they may involve an appreciable alteration in the appearance of the background. In areas known to be subject to frequent photographic reconnaissance, this should if possible be avoided.

3. Turfing of concrete surfaces

Where buildings made of brick or concrete have been partially buried it may be necessary to turf over the roof in order to build up a gentle mound. Unless this is correctly done, the turf will die. The following routine should be observed :—

- i. Cover the whole area with C.G.I. or some other material which would prevent moisture being drawn out of the soil above.
- ii. Lay a layer of damp sandbags.
- iii. Lay a 2-in. layer of topsoil which should have been set aside for the purpose.
- iv. Press turf into position.

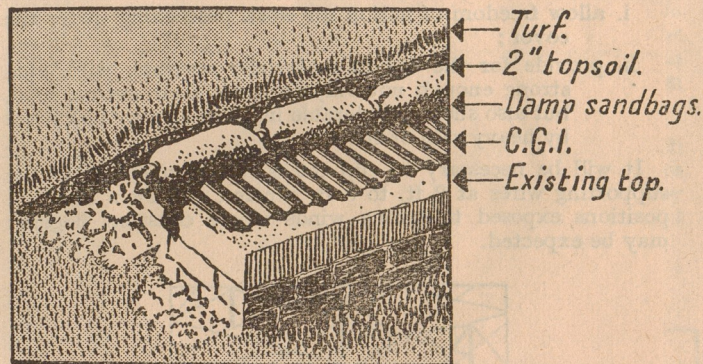


Fig. 1

NOTE.—There is no difference of method between the restoring of ground damaged by work carried out under overhead cover and work carried out under ground coverings, though there will be a difference in degree in that the former will tend to be more concentrated, and the latter more spread out though possibly less intense.

5. Large permanent covers

1. Permanent overhead covers may be erected to conceal dumps, vehicle parks, big gun installations, etc. Their success in defeating observation will depend on (a) the materials used, (b) the general design, (c) good siting, (d) good planning and concealment of entrance and exits.

2. Materials

Any suitable covering material may be used such as steel wool, garnished fish netting or natural materials such as bracken or heather. Natural materials may either be used alone or to break up large expanses of steel wool, etc. The only essential is that the texture and colour of such materials should match the background. Against plain backgrounds there is a danger that artificial materials manufactured in rolls or sheets may show slight variation in tone where sections are joined. On a large cover the cumulative effect may be to make the cover extremely conspicuous. This danger can only be met by spray painting after erection or, should the background permit, by the addition of natural materials.

3. Design

The design should :-

- i. allow freedom of action for work proceeding under the cover ;
- ii. provide for the use of materials, uprights, wire, etc., strong enough not only to carry their normal load, but also such considerable increase as may be caused by heavy rain or snow.

It will be necessary to clip the covering materials to the supporting wires at 2 ft. to 3 ft. centres, and even closer in positions exposed to strong winds where constant flogging may be expected.

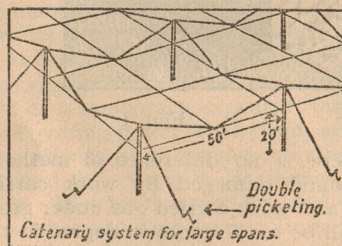
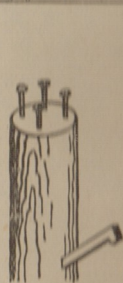
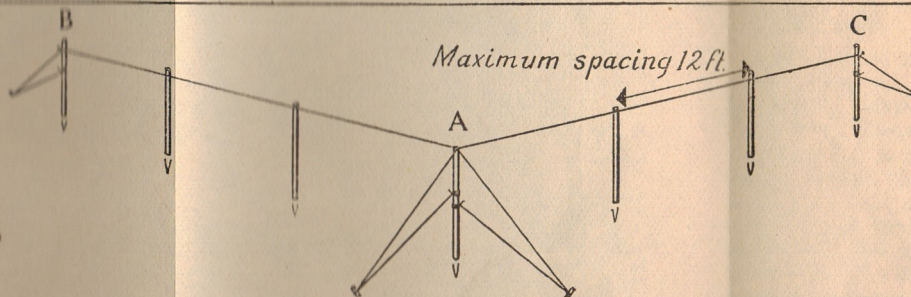


Fig. 2 (a)

HOP POLE method of constructing FLAT COVERS

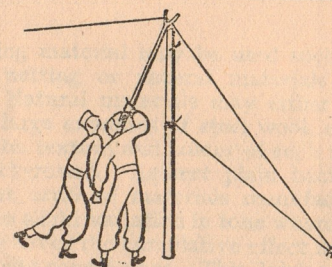


4 nails are driven into the top of each post.

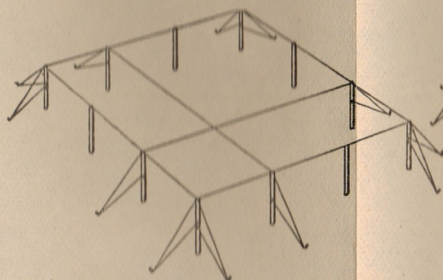


1 Erect outer posts along two sides of area to be covered; these posts to be driven into ground.

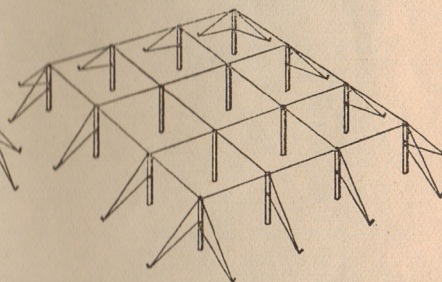
2 Strain wire hand taut over top of pole 'A' and over 3" nail one foot from top of poles 'B' & 'C'



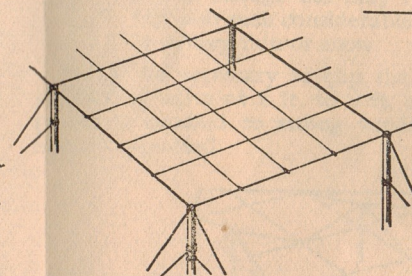
3 Strain wire over top of end posts and then intermediate posts with a strong stick.



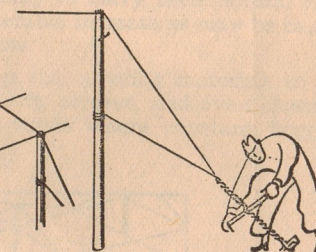
4 Erect other sides in same manner & strain wires across central area.



5 Inner props are not driven into ground, but held erect by pressure of wires & so can be removed without collapsing structure.



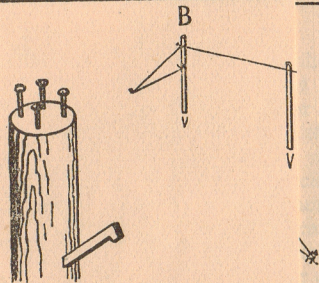
6 Cross wires are added at 3 ft. intervals to give extra support to cover.



After cover has been put up take up slack on guy wires with Spanish windlass.

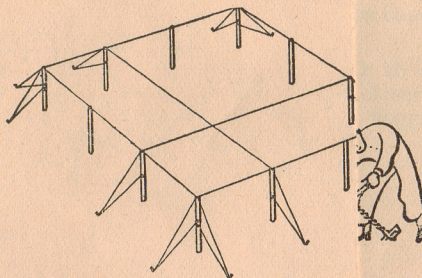
Fig. 3

HOP POLES



4 nails are driven into the top of each post.

1 Erect two covers be drawn



4 Erect other sides in same manner & strain wires across central area.

25 up res ndlars.

Uprights should be sunk into the ground until a firm foundation is reached or provided with base plates to prevent their sinking under heavy loads and so causing the cover to sag. Those on the edge should lean slightly outwards.

When large spans are necessary, the Catenary system may be used.

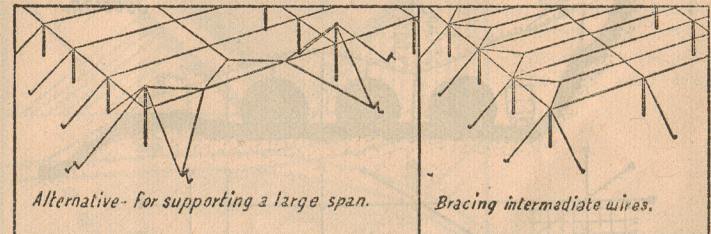


Fig. 2 (b) and (c)

The projecting poles may, if desired, be masked with tree tops to suggest low bushes. Adequate strainers and strong wire such as 7-strand fencing should be used, and double picketing will probably be necessary. Wire must always be attached to pickets at absolute ground level. Failing the provision of adequate straining tackle, the hop pole system of straining here illustrated may be used.

Guys should be picketed not less than an upright's length away, so meeting the ground at an angle not greater than 45 degrees. Should picketing space not be available they may be returned towards the interior of the cover by the method here shown.

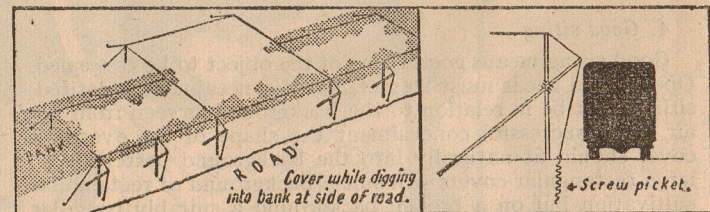


Fig. 4 (a) and (b)

Against a flat background the surface of the cover should be flat but frequently an irregular surface may be desirable. Changes in plane must not, however, be allowed to appear as sags.

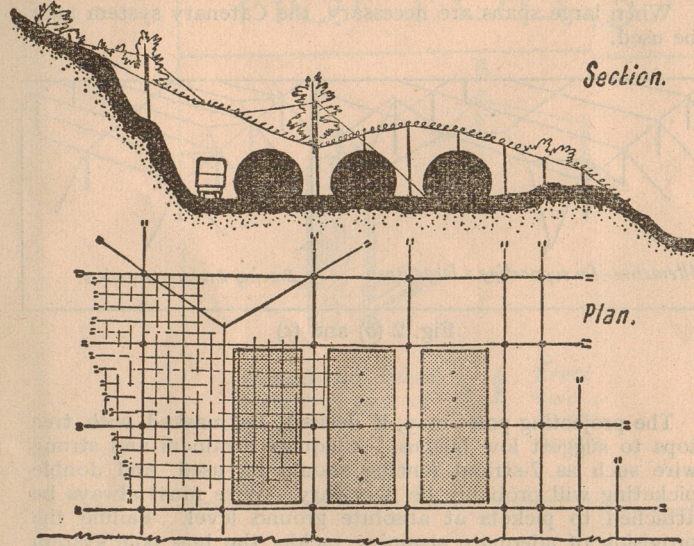


Fig. 5

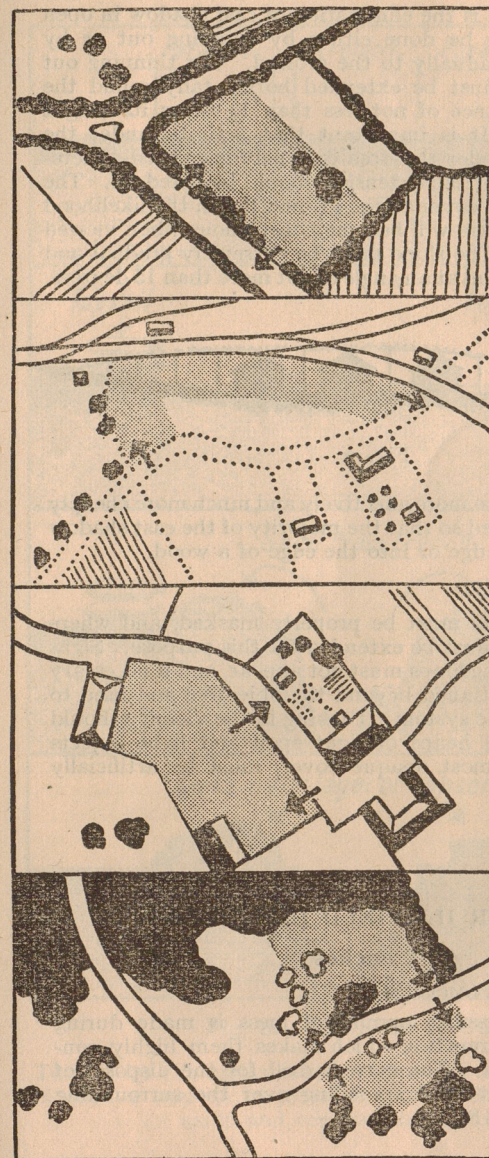
If sags become visible from the air, the position will probably be revealed therefore supporting wires must be sufficiently closely spaced to prevent this happening. When the background permits, natural or artificial foliage should be used to prevent the hard lines of the supporting structure becoming visible and natural background features such as hedges or tracks should be repeated on the roof of the cover.

4. Good siting

Good siting means good siting of the object to be concealed. Operational needs must be met, but if concealment is desired, siting must be in relation to the background as seen from the air. For successful concealment the shape of the overhead cover should fit naturally into the background pattern, e.g., large rectangular covers will suit a background of rectangular cultivation but on a broken background a suitably irregular form should be created.

Fig. 6

SITING OF LARGE COVERS



(a) For hedged fields, edges of cover masked against hedges and trees

(b) By a railway junction

(c) Among farm buildings

(d) In parkland. An irregular plan to suit the background. Edges of cover masked by false trees and tree-tops (shewn in white)

A further problem is the elimination of cast shadow in open country. This may be done either by thinning out or by sloping the cover gradually to the ground. For thinning out purposes, the net must be extended horizontally round the perimeter to a distance of not less than $1\frac{1}{2}$ times its height from the ground. It is important that activity under the cover be confined under the area opaquely garnished—therefore the ground under the extension should be wired off. The danger of sloping the cover to the ground lies in the likelihood that the mounded form will become conspicuous when viewed at low sun angles. The slope must be extremely gradual and should meet the ground at an angle of not more than 15 degrees.

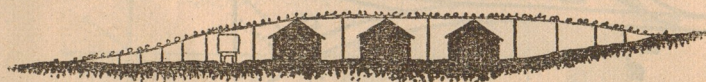


Fig. 7

Cast shadow may be more effectively and much more cheaply lost if the cover is sited so that the majority of the cast shadow falls against a tall hedge or into the edge of a wood.

5. Entrances and exits

Entrances and exits **must** be properly masked, and where necessary the cover must be extended for this purpose. Signs of M.T. such as turning loops must not appear, and if necessary tracks should be continued beyond the objective and used to carry a one-way traffic system. Parking in the vicinity should not be allowed. All heaps of light spoil and light objects under any but the most opaque cover, must be artificially darkened or covered.

CHAPTER II.—FIELD DEFENCES

6. Trenches

1. Fire trenches and breastworks

Usually an unnecessary amount of mess is made during the construction of trenches, which makes them highly conspicuous from the air. The correct drill for the disposal of turf so as to prevent spoil spreading over the surrounding grass is shown in Fig. 8.

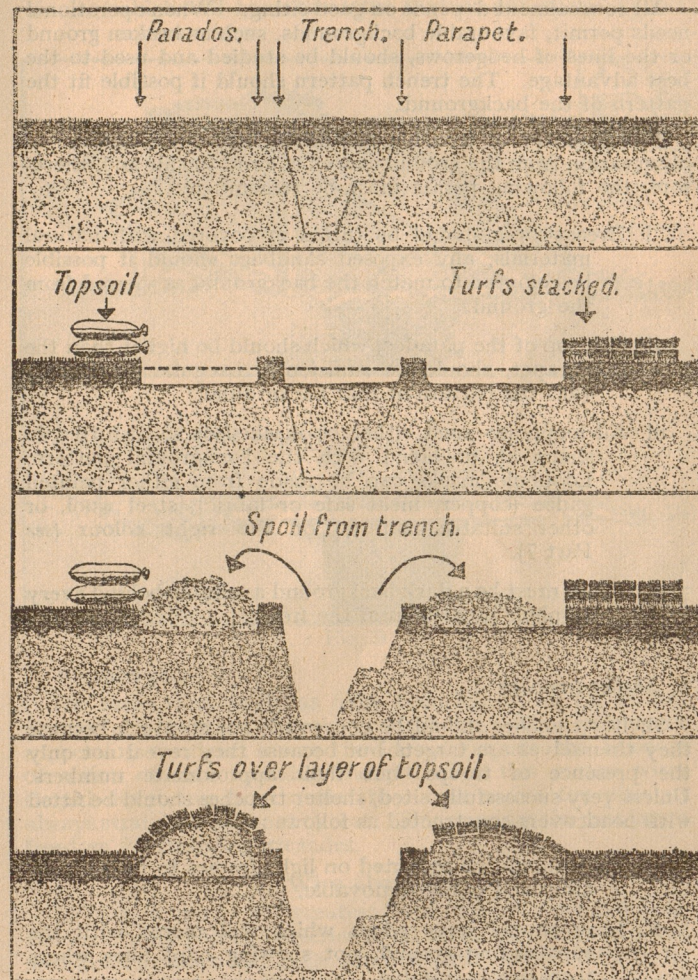


Fig. 8.—TRENCH DIGGING

Turf to be cut and stacked to prevent spoil spreading, and in such a way as to preserve roots. Top soil must be set aside and replaced before returning.

All concealment depends on good siting. When operational needs permit, favourable backgrounds, such as broken ground or the lines of hedgerows, should be studied and used to the best advantage. The trench pattern should if possible fit the pattern of the background.

The majority of trenches should be treated as subject to observation from the ground as well as from the air and, therefore, the following points must be remembered :—

- i. Breastworks should be turfed or covered with natural materials, any exposed sandbags should if possible be coloured to match the background as viewed from the ground.
- ii. The top of the parapet, which should be higher than the parapet, should be sufficiently irregular to link up with the pattern of that background.
- iii. All loopholes must either be masked or so distorted in shape as to blend with the background pattern. Loophole masks can be made from either painted gauze (copper, meat safe or fabric), steel wool, or other suitable material of the right colour (see Part 7).
- iv. There must be a dark background available behind every loophole as seen from the front.

2. Shelter trenches

Shelter trenches should be concealed, not so much because they themselves are targets but because they reveal not only the presence of troops, but their approximate numbers. Unless very successfully sited, shelter trenches should be fitted with headcovers constructed as follows :—

- i. They should be mounted on light frames to be immediately and easily removable.
- ii. They should have edges which will merge with the surrounding ground, not showing hard lines where these are unsuitable.
- iii. They should be broad enough to cover all surrounding spoil.
- iv. They should be covered with a material (wire garnished with hessian strips, or brushwood, or steel wool)

which will have the same texture and colour as the surroundings.

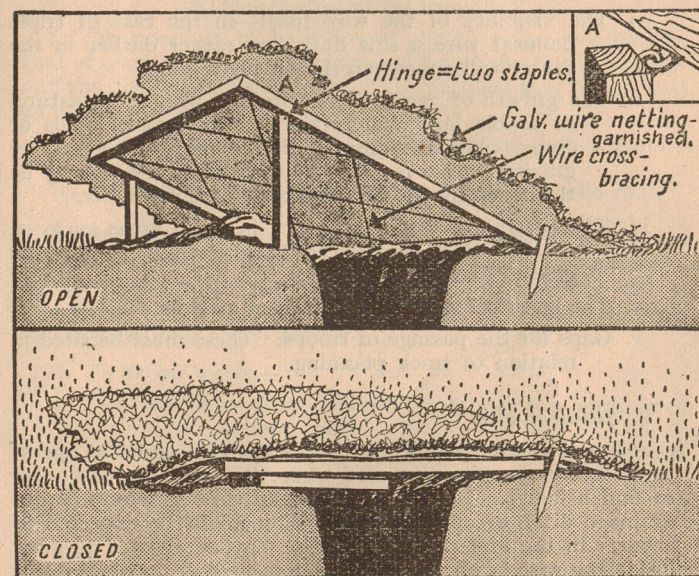


Fig. 9

3. Weapon pits

The same rules apply as have been laid down for shelter trenches, with the following additions. The framework supporting overhead cover should not impede the freedom of action of men manning the pit. For this reason wires should never run from corner to corner across the pit, but always straight from front to rear. This provides the maximum freedom for throwing grenades.

7. Wire obstacles

1. Wire is one of the greatest betrayers of concealed positions. Strong points, batteries of all sorts, carefully sited and well hidden camps and H.Qs. are frequently revealed by badly sited wire. It is hardly ever possible to site wire so that it cannot be seen. If possible, wire should be sited along the line of a convenient hedge or ditch; but concealment of wire sited in the open is not impossible. Given favourable terrain and reasonably suitable background, wire may be sited in full view of the enemy air observer and yet escape notice.

The factors which make wire conspicuous to air observation are :—

- i. The visibility of the wire itself—in the case of triple dannert wire a soft dark line rather darker in the centre will appear on the air photograph.
- ii. The growth of vegetation—wire laid on grass, pasture, or arable land will retain growing grass, weeds or crops, when the ground around may be levelled by grazing or harvesting—in the autumn wire may be thickened by the accumulation of fallen leaves.
- iii. The possibility that grass, etc., in small areas enclosed in wire may be allowed to grow higher than the ground outside.
- iv. The tracks of the wiring party and patrols.
- v. Gaps for the passage of troops. These must be sited in relation to track planning.

2. Siting of wire

A simple rule for siting wire in the open is—as far as operational needs permit—site wire where it might be reasonable to find a hedge. If in hedgeless country, site wire where a drainage ditch or agricultural division might be expected to occur. In the first case, grass, etc., may be allowed to grow inside the wire or on the enclosed area and all that will result is an inconspicuous and harmonious addition to the field pattern; but in the second case it will be necessary to cut grass growing among the wire from time to time.

Tracks must be kept to a minimum, but either of these methods may permit a reasonably narrow track to pass without comment.

It is not always easy to realize that variations in background tone which are almost invisible at ground level may be very clear to the air view. A field of apparently uniform stubble may, from the air view, show clear signs of agricultural boundaries and wire sited along these will fit into the ground picture. It is therefore important that air photographs should, when possible, be consulted if wire is to be sited so as to deceive air observation.

Often an angular lay-out is the one likely to fit into the background. This may require the use of rather more than the usual amount of wire, but the extra expenditure of material is justified if the circular border conspicuously bounding a concealed position can be made to disappear.

(See Plate II.)

CHAPTER III.—PILLBOXES

8. Concealment by merging

1. The principle to be followed should where possible be that of merging with the background by elimination of shadow and the distortion of silhouette. The problem may be grouped as under :—

- i. Posts which are used for anti-aircraft as well as ground defences.
- ii. Posts for ground defence only and having a solid roof.

2. Many pillboxes are sunk into the ground and in all cases the lower the roof level the greater is the chance of concealment. In almost every case the concealment will be against observation and attack from both ground and air. The features which will betray the position are :—

i. To the air view :—

- (a) Shine from concrete roofs and top surfaces of breastworks.
- (b) Shadow inside the breastwork (for anti-aircraft positions).
- (c) Shadow cast by the breastworks.
- (d) The track leading to the position.

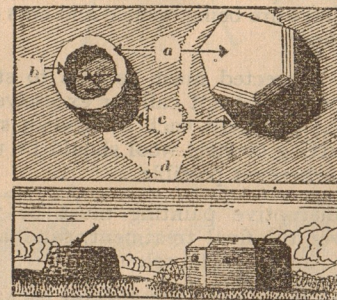


Fig. 10

ii. To ground view :—

- (a) The silhouette of the position against its background.
- (b) The shadows inside the loopholes.
- (c) The texture and colour of the exterior surface.

3. Shine from concrete roof surfaces

This is sufficiently revealing to need special consideration and working parties should be instructed to kill roof shine immediately after construction irrespective of any treatment that may be contemplated. The simple coat of dark paint is not enough. Gravel or chips held on a tar base are a help, but better results are obtained if old rope ends, sandbags and bits of waste coir or hessian can be worked into the concrete while still soft, allowed to set into the surface and suitably painted. An even better method is to mound extra concrete on to the roof so as to create a surface as rough as a ploughed field which can then be painted. The ideal treatment is probably a combination of the last two methods.

4. Rules for merging

Merging involves intelligent use of any suitable covering material, attached to a built-up framework and so designed as to cover or distort the danger spots. The following rules should be observed :—

- i. The outline of the cover must not repeat the outline of the pillbox or post. Regularity must be avoided and standard types of treatment must always be modified to suit individual cases.
- ii. Operational requirements must be met. The covering that delays fire being opened and cuts down visibility is a danger.
- iii. Whatever is erected must be able to stand wear and tear and should not call for excessive maintenance. Artificial materials such as hessian strip, feathered wire netting or steel wool should be used instead of foliage wherever possible.
- iv. Routine disruptive painting must be forbidden, but whatever the final treatment, sandbags and pillbox surfaces must first be coloured
 - (a) to blend with the general background colour ;
 - (b) to fit into the background pattern by the use of two or more suitable tones and colours.

It must be remembered that the method and details must depend entirely on local conditions which need never repeat themselves and the alternative methods here described and illustrated must only be taken as basic types to be modified as conditions dictate.

The success of merging in defeating fairly distant ground observation will depend upon the position of the object to be merged in relation to its background.

In all cases it is essential not only to be against an appropriate background, but to be as close to that background as possible.

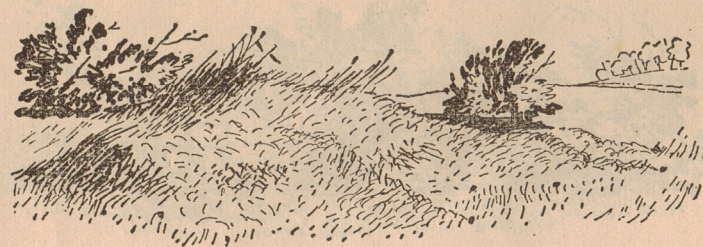
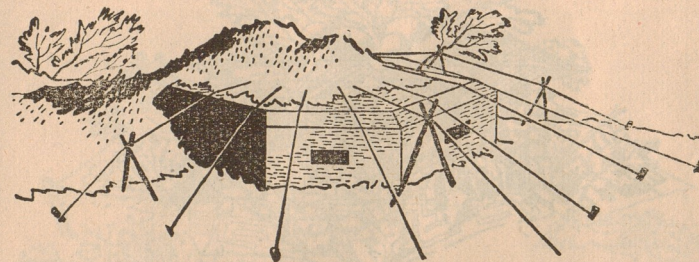
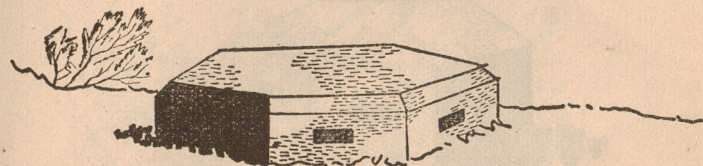


Fig. 11.—Concealment by merging
Construction details

If thick hedges are available, M.G. posts should be sited in the hedge itself rather than in front or behind.

It must also be clearly understood that the method of merging into the background is unlikely to be successful

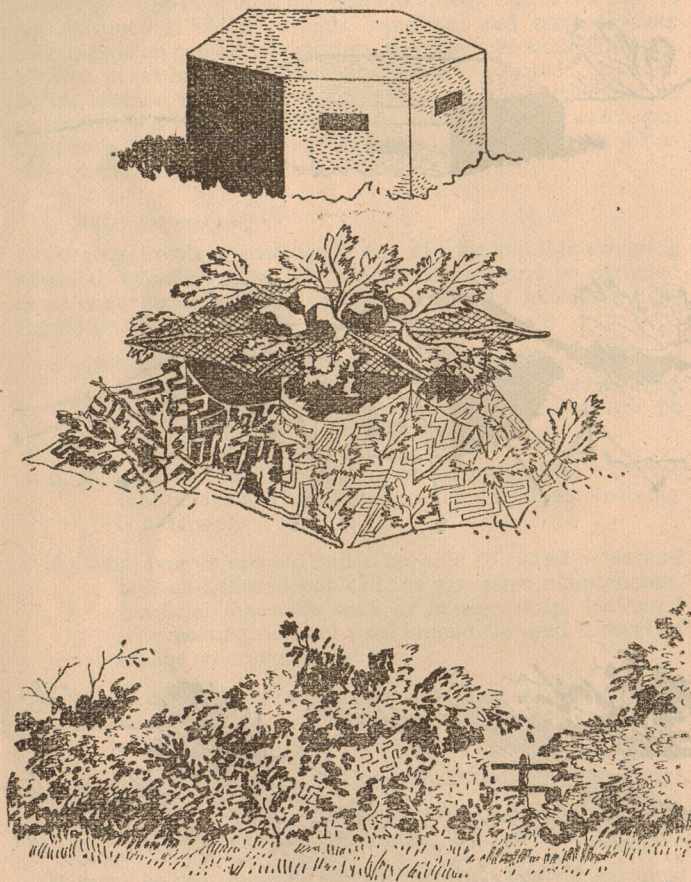


Fig. 12.—Concealment by merging
Construction details

against close ground observation such as may be expected from mobile scouting units working ahead of advancing tanks.

Almost always complete disguise is the only counter to close inspection.

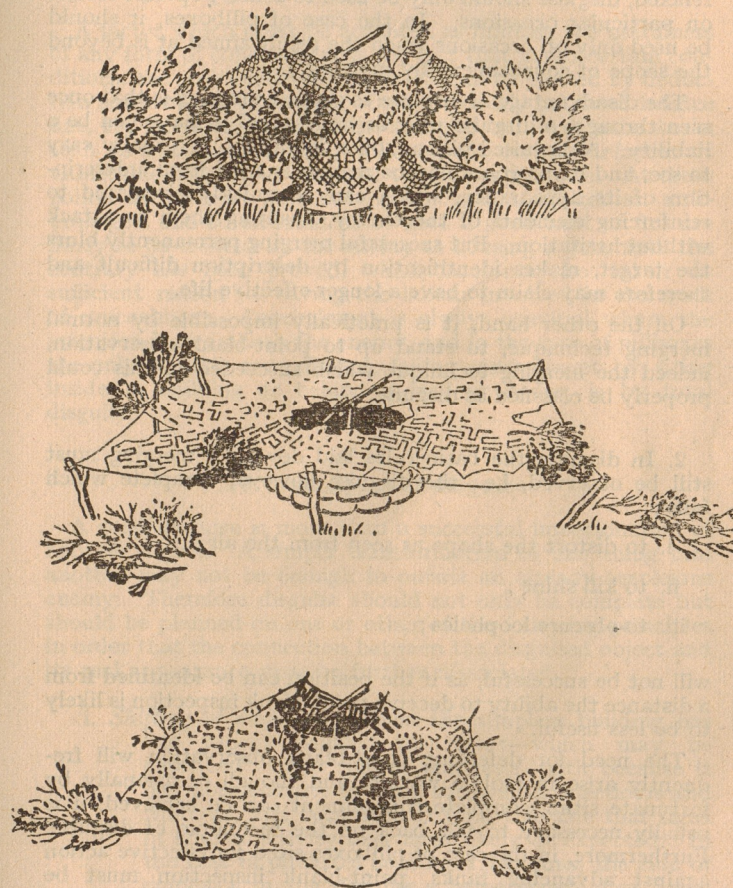


Fig. 13.—Three types of merging treatment
(A.A. L.M.G.)

9. Concealment by disguise

1. The value and limitation of disguise

Whereas the discipline of concealment must never be relaxed, disguise should only be used to achieve specific results on particular occasions. In the case of pillboxes, it should be used only on occasions when the result aimed at is beyond the scope of concealment by merging.

The disadvantage of disguise as against merging is that once seen through, a disguise may be useless and it may even be a liability. A disguised pillbox, once identified, is usually easy to see, and its position may be readily located from a description of its appearance, which can be quickly circulated to reinforcing elements of the enemy, enabling them to attack without hesitation. But successful merging permanently blurs the target, makes identification by description difficult and therefore may claim to have a longer effective life.

On the other hand, it is practically impossible by normal merging technique, to stand up to point-blank observation, indeed the merging technique which succeeded in this could properly be classified as disguise.

2. In disguise the basic rules laid down for merging must still be observed, i.e., the disguise however complete which fails :

- i. to distort the shape as seen from the air ;
- ii. to kill shine ;
- iii. to obscure loopholes ;

will not be successful, as if the position can be identified from a distance the ability to deceive point-blank inspection is likely to be less useful.

The need for defeating point-blank observation will frequently arise in mobile warfare and though occasionally by fortunate siting complete concealment can be achieved, it is usually necessary to fall back on the technique of disguise. Furthermore, in the case of pillboxes sited for effective action against advancing tanks, point-blank inspection must be defeated if that action is to be effective.

Not only must reconnaissance units fail to locate the position, but the target must be induced to present itself at a convenient range. The failure of concealment may result

in the target not presenting itself at all, and in the p being outflanked or attacked by a weapon to which it effectively reply.

3. Disguise of predictable positions

A factor which must be accepted as limiting the usefulness of any form of concealment is the fact that under certain conditions, the positions of strong points can be plotted by deduction however well concealed. On a previously prepared defence line, the lie of the land and the siting of visible defence works such as anti-tank ditches, will call for certain defences at vulnerable points and points of tactical importance. At these points all cover or objects large enough to shelter an anti-tank gun and so situated as to give a good field of fire are likely to be treated by the enemy as housing a gun, until the contrary has been proved, which facts may be taken as sufficient reason for saving the labour involved in the work of concealment. Concealment is always essential where the intention is to ambush the enemy, and in the case of pillboxes the only possible concealment, failing concealment by siting inside a building or behind a wall or hedge, is by total disguise.

10. Principles of disguise

A good disguise is more than a successful impersonation of another object. A simple transformation of one thing into another may not be enough to outwit an already suspicious enemy. Therefore disguise should not only be complete but should be planned on one or other of the following principles in order that the connection between the disguised object and its real appearance may be further dissociated.

- i. *Shifting of emphasis.*—Even the simplest building has one aspect—usually the front—which may be described as the side of emphasis, both because it has more features to catch the eye, such as doors and windows, and because it is from this side that signs of human activity may most likely be expected. In the case of pillboxes housing A.Tk. guns, the side of emphasis in the disguise scheme should face away from the line of fire. The wall containing the embrasure opening should be treated as the back or side in the disguise scheme, and made as featureless as possible, while a suggestion should be made that

signs of life may be expected to appear from some other direction.

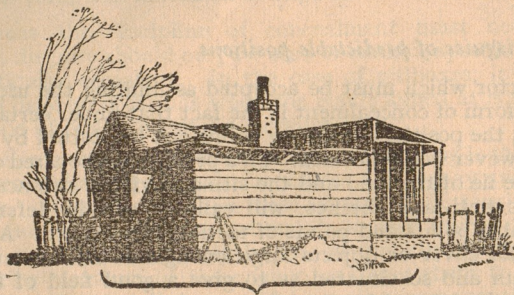


Fig. 14.—Shifting of emphasis

- ii. *Linking up with the surroundings.*—Where possible the method described above should be continued to the point of establishing the closest connection both actual and by association with neighbouring buildings. The simple extensions of pillbox walls to join the sides of buildings or other walls, and the treatment which supports the impression that the disguised pillbox is a natural part of an established group will give an illusion of age and permanence and do much to allay suspicion.

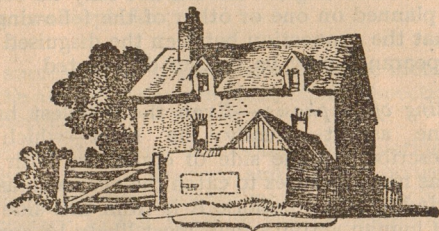


Fig. 15.—Linking up

- iii. *Division.*—Disguise of isolated pillboxes may be more effective if based on the principle of dividing the general mass into two apparently separate ones,

neither of which would by themselves be large enough to contain the concealed object.

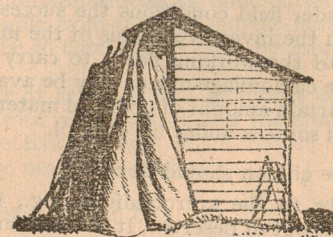


Fig. 16.—Division

- iv. *Misdirection.*—A disguise is more likely to be successful if it can escape close scrutiny. Therefore when possible some object should be established near-by which will draw the observer's eye away. This object should be reasonably conspicuous and contain an adequate element of tonal contrast, but should not be unnaturally vivid or unsuitable to the surroundings. Unless the object so placed can be immediately accepted as a natural feature of the landscape, the suspicion of the enemy may be aroused.

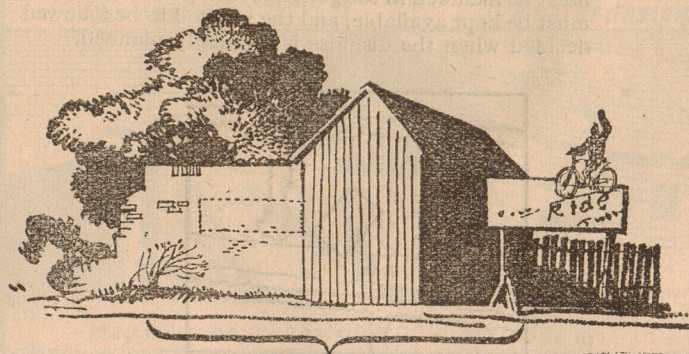


Fig. 17.—Misdirection

11. Rules for disguise of pillboxes

1. In cases where covers are erected to hide the work of construction, these should remain up until the work of disguise is complete. Under field conditions the success of a disguise will depend upon the inventive genius of the man on the spot and the ability of the working party to carry out his ideas. The advice of the camouflage officer may be available and it is possible that a certain amount of artificial material for disguise may be had from sources under his control.

2. The disguise chosen should be :—

- i. Appropriate to the surroundings, e.g., milkbars must not grow out of deserts. It is however not necessary to credit an invading army with too detailed a knowledge of local variations. For instance, plaster casts of a type of tile or bond of brick peculiar to the Midlands may if desired be used in Kent without serious risk.
- ii. Lacking in interest and inconspicuous. Gipsy caravans and public monuments are somewhat at a disadvantage in that they by their nature challenge inspection.

3. The following points should be remembered :—

- i. Disguise must defeat inspection from all angles, rear as well as front. If outflanked but still unobserved, the usefulness of an ambush is not necessarily at an end.
- ii. Blast walls made of sandbags or other materials which may have to be erected after disguise proper is finished must be included in the general scheme. The materials must be kept available, and the method to be followed decided when the disguise is originally planned.

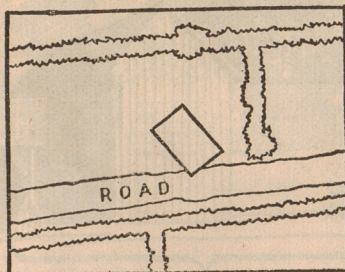


Fig. 18

iii. Anti-tank pillboxes covering probable lines of approach are often sited at an oblique angle to the nearest straight line—hedge, road, canal or railway. This deviation from the background pattern is immediately noticeable from the air, and the first aim of disguise must be to correct this fault by roof extensions, etc.

iv. Some sort of artificial roof is almost always necessary, but a roof which covers half the area while probably as effective as one which covers the whole, will require much less material.

v. All structures should be :

- (a) designed so that if dislodged, the loopholes are not blocked, e.g., the ridge of the roof for an anti-tank pillbox must run from front to rear of the box, thus minimizing this danger ;

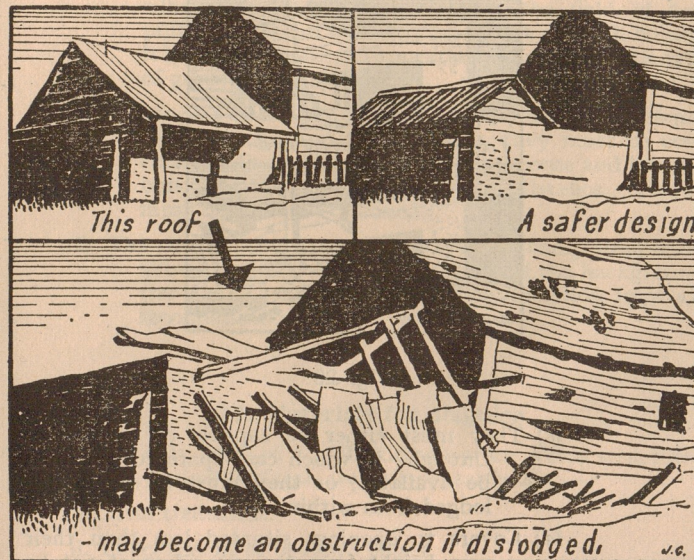


Fig. 19

- (b) secured as firmly as possible. For the purpose of securing falsework to a pillbox, reinforcing material should be left projecting during construction at convenient points.
- vi. Surfaces covered by structures must not be left untreated but must always be painted a suitable dark tone, so as not to catch the eye should false work be dislodged.
- vii. Loophole and embrasure covers—these are in all cases essential and must conform with the following requirements :—
- (a) They must conceal the existence of the loophole when seen from the outside.
 - (b) They must not impede observation from inside. Copper, meat-safe or window gauze are the best materials. It may be sufficient if they are made of wood and if a small observation slit 3 in. by 2 in. is cut and then gauzed and painted.



Fig. 20

- (c) They must either be capable of being shot through—in which case spare covers must be available, or they must be easily dislodged from within.
- (d) Covers to openings situated less than their own height from the ground must not be hinged, but must be constructed so as to

fall clear. Hinging is dangerous because debris falling immediately below the opening may prevent the cover dropping clear of the field of fire.

- viii. Many pillboxes have sides bevelled at the top and corners. These bevelled edges are very revealing and must be hidden, especially those at the top which shine badly in wet weather.
- ix. In the case of concrete pillboxes advantage should be taken of the possibility of imprinting any desired form of pattern on the surface during construction, e.g., sheets of corrugated iron inserted inside or used instead of the wooden shuttering will leave a corrugated impress. This can be painted and the effect of C.G.I. obtained with little cost. The addition of very small quantities of real or artificial material is then all that is required to create a complete disguise.
- x. Great attention should be paid to lateral extensions and to linking up with adjoining objects, and to silhouette. If without blocking the field of fire, pillbox walls can be extended to link up with houses, it is easy to create the appearance of a harmless length of garden or yard wall.
- xi. If trenches or weapon pits are dug as part of the defence system hinging on the pillboxes, they must be concealed with overhead covers. Cookhouse and latrines must be either under cover or at a distance. Tracks must be carefully planned.
- xii. The position must not be betrayed by badly sited wire. Wire must follow the natural lines of the background (see Sec. 7), and thereby escape detection from air reconnaissance.

12. Materials for disguise

1. The only parts of a pillbox disguise for which structural materials, real or artificial, are indispensable are :—
 - i. Roof treatment.
 - ii. Concealment of bevelled edges.
 - iii. Loopholes, embrasures and entrances.

iv. Wall extensions.

v. For the concealment of form, on pillboxes not of rectangular design.

Wherever possible paint should be used to simulate real building materials such as weather boarding, brickwork, C.G.I., etc., but for this purpose an adequate standard of craftsmanship is necessary. Disguise painting requires great skill, but results in economy of materials. Every effort should therefore be made to discover whether this type of talent (scenic painting) is anywhere available.

2. Artificial materials

The advantages of artificial materials such as plaster, C.G.I., tiles, wooden or stone surfaces, are :—

- i. They may be available when the genuine articles are not ;
- ii. they may be cheaper ;
- iii. their use requires less time and labour ;
- iv. they are light to transport ;
- v. they can imitate any surfaces.

Plaster reproductions are non-inflammable. It must however be remembered that they are not so durable and require maintenance, and also that their use does not eliminate the need for timber.

3. Artificial wall surfaces

A useful formula for the creation of artificial walls is as follows : On rough framework, covered with hessian and wire netting, apply the following mixture—two parts cement, one part cowdung, two parts water. This can be treated to represent any surface and coloured with lime or distemper. To give an appearance of age use cowdung, soot, oatmeal and water, the mixture to be of a consistency that can be sprayed through a stirrup pump. The oatmeal in the mixture will encourage the growth of lichen.

4. Artificial foliage

Artificial foliage should be used in preference to living foliage wherever continual replacement is difficult. The

most suitable material is feathered wire netting which should be cut and used as shown.

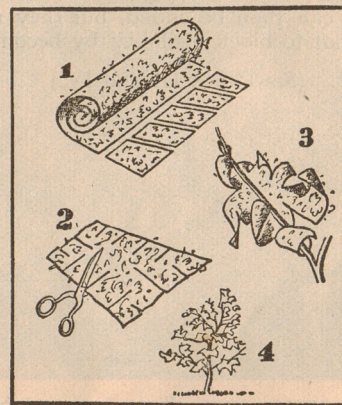


Fig. 21.—Artificial foliage

5. Dummy haystacks

The three faults common to the construction of dummy haystacks are :—

- i. They do not stand up to exposure.
- ii. they are too large ;
- iii. hay and straw is too thick. Straw should be thinly spread between two lengths of galvanized wire netting which should be joined at 2 ft. centres with sewing wire. Lengths can then be fixed to the framework and wired together. By this means an artificial stack can be produced from which the straw will not be blown away, and which will contain the minimum of inflammable material. The design of the framework will vary according to the type of stack to be copied, but the framework should be kept as close to the pillbox walls as possible.

6. Rubbish heaps

For rubbish heaps the use of old bicycles, tins, baths, perambulators, is not alone sufficient. To turn a pillbox into a rubbish heap—first paint the surface, then mound over with steel wool, galvanized wire netting or some suitable material—the decorations can then be added, but they must be firmly attached so as not to block visibility by becoming dislodged.

(See Plates III and IV.)

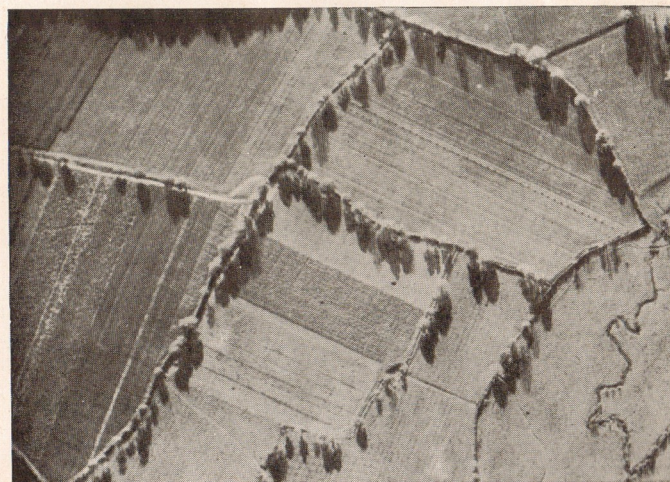


BACKGROUNDS

Plate I

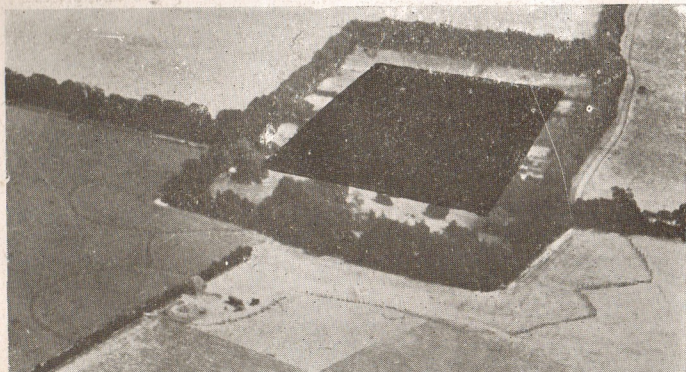


Against this background work may escape notice if spoil is carefully disposed of

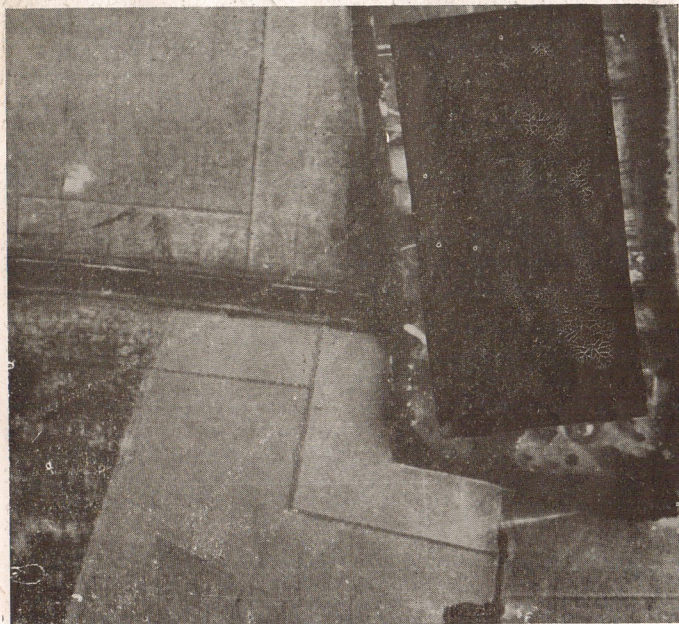


Overhead cover would be needed here

WIRE SITING

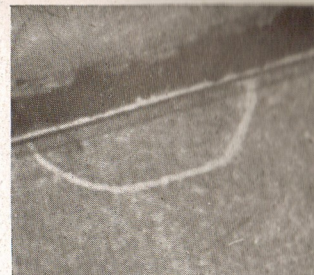
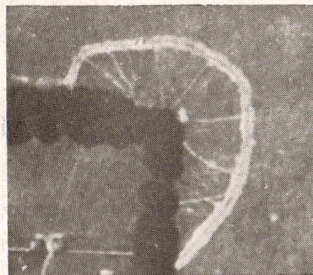


Bad



Good. The conspicuous circles have been straightened out to conform with the existing ground pattern

WIRE



L.M.G. post. Tracks of wiring party



When grass and weeds grow up



Grass outside the wire has been grazed

PILLBOX MOUNDING

Plate III



Summer



Winter



Looking out

RUBBISH HEAPS

Plate IV



Good



How not to do it—one loophole already blocked—more to follow



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